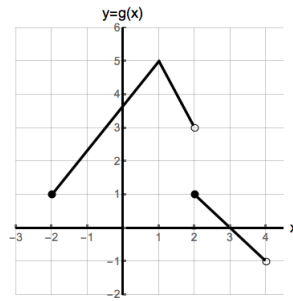


1. [22 points] Consider the functions  $f(x)$ ,  $g(x)$  and  $h(x)$  given below:

$x$	-1	0	1	2
$f(x)$	-5	6	2	1



$$h(x) = 2x - 7$$

- a. [4 points] Find the domain and range of  $g(x)$ . Use inequalities or interval notation to express your answers.

*Solution:* Domain:  $[-2, 4)$ , Range:  $(-1, 5]$

- b. [11 points] Find the values of the following expressions. If any of the values is not defined, write "Undefined".

*Solution:*

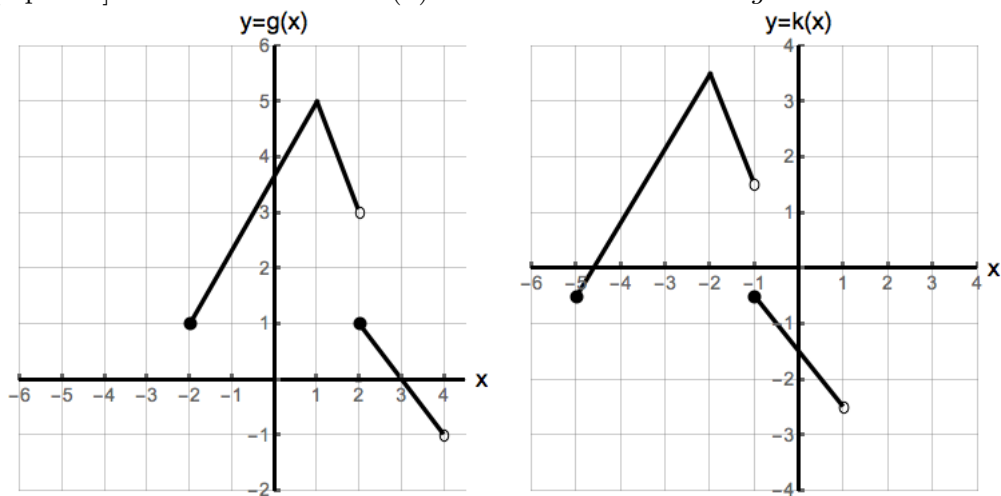
- i)  $g(2) = 1$
- ii)  $(f(0))^{-1} = 1/6$
- iii)  $h^{-1}(2) = 9/2$
- iv)  $g(f(2)) = 5$
- v)  $g(g(-2)) = 5$
- vi)  $h(f(-1) + 1) = -15$

- c. [4 points] Find all solutions to the equation  $h(g(x)) = -5$ . Recall that  $h(x) = 2x - 7$  and the graph of  $g$  has been copied below in part d) for your convenience.

*Solution:*

$$\begin{aligned} h(g(x)) &= -5 \\ 2g(x) - 7 &= -5 \\ 2g(x) &= 2 \\ g(x) &= 1 \\ \text{Answer: } x &= \pm 2 \end{aligned}$$

- d. [3 points] Find a formula for  $k(x)$  in terms of the function  $g$ .



*Solution:* To obtain the graph of  $k(x)$  we need to perform a vertical shift 1.5 units down and a shift left 3 units. Hence,

$$k(x) = g(x + 3) - 1.5$$